Claims

What is claimed:

1. A monolithic display device, with an applied electric field across it, comprising of a light-emitting material and a light-sensing material such that when the device is illuminated by a laser, photo-current amplification occurs within the device causing light emission from the light-emitting material.

2. A display device as in claim 1, wherein there is a restricted area of light addressing that has a relation to a restricted area of light emission such that as the area of light addressing is transferred across the screen, the area of light emission does so identically in order create an image.

3. A monolithic display device comprising of a light-emitting area, a light-sensing area and a semiconductor junction such that the light-sensing area when illuminated by a laser causes carriers to be formed that lower a voltage barrier at the semiconductor junction thereby causing larger amount of other carriers to flow through towards the light-emitting area for light-emission, in presence of an applied electric field across the device.

4. A monolithic display device comprising of a light-emitting area and a light-sensing area, such that the light-sensing area when illuminated by a laser causes a voltage imbalance which causes an amplified amount of others carriers to flow towards the light-emitting area resulting in light emission, in presence of an applied electric field across the device.

5. A monolithic display device comprising of a light-emitting area and a light-sensing area, wherein there is a carrier blocking layer which resides in between the light-sensing material and the light-emitting material.

6. A monolithic display device, with an applied electric field across it, comprising of a light-emitting area, a light-sensing area, wherein there is a carrier blocking layer which resides in between the light-sensing material and the light-emitting material such that the blocking layer blocks one type of charge carrier that flows towards the light-sensing area in presence of an applied electric field.

7. A monolithic display device, with an applied electric field across it, comprising of a light-emitting area, a light-sensing area, wherein there is a carrier blocking layer which resides in between the light-sensing material and the light-emitting material such that the blocking layer blocks one type of charge carrier that flows towards the light-sensing area in presence of an applied electric field, such that the light-sensing material is a good conductor of carriers not being blocked.

8. A monolithic display device, with an applied electric field across it, comprising of a light-emitting area and a light-sensing area, wherein there is a carrier blocking layer which resides in between the light-sensing material and the light-emitting material such that there is a potential barrier at the anode contact with the device.

9. A monolithic display device comprising such that there is a N-type light-emitting material beside the cathode, carrier blocking layer after the light-emitting layer, a P-type light-sensing material after the carrier blocking layer and a N-type material after the light-sensing material.

10. A display device as in claim 8 wherein the anode-contact is an efficient hole injector.

11. A display device as in claim 8 wherein the anode-contact is an efficient hole injector made of Indium Tin Oxide.

12. A display device as in claim 8 wherein the light-sensing area is made of P-type organic semiconductor.

13. A display device as in claim 8 such that the N-type light-emitting material is beside the cathode, carrier blocking layer after the light-emitting layer, a P-type light-sensing material after the carrier blocking layer and a N-type material after the light-sensing material forming a potential barrier at the anode contact with the device.

14. A display device as in claim 13 wherein the N-type light-emitting area adjacent to the anode-contact is made of N-type organic semiconductor made of tris (8-hydroxy-quinoline) aluminum (Alq_3) material.

15. A display device as in claim 13 wherein an incident laser on the light-sensing area causes a charge buildup on the anode-contact; wherein the N-

type material adjacent to the anode-contact is made of such a material that it takes longer for the charge to dissipate than in case of Alq_3 material.

16. A display device as in claim 13 wherein an incident laser on the light-sensing area causes a charge buildup on the anode-contact; wherein there is a thin layer of a material at the anode-contact such that it takes longer for the charge to dissipate.

17. A display device as in claim 13 wherein an incident laser on the light-sensing area causes a charge buildup on the anode-contact; wherein the N-type material adjacent to the anode-contact has a trap energy level for trapping dissipating charges because of which it takes longer for the charge to dissipate a the anode-contact.

18. A display device as in claim 13 wherein an incident laser on the light-sensing area causes a charge buildup on the anode-contact; wherein there is a thin layer of a material, at the anode-contact, having a trap energy level for trapping dissipating charges because of which it takes longer for the charge to dissipate a the anode-contact.

19. A display device as in claim 13 wherein the anode-contact is made up of a high work function metal and the potential barrier at the anode is a Schottky junction.

20. A display device as in claim 13 wherein the light-sensing area is sensitive to infrared light only and the light-emitting area emits visible light only.

21. A display device as in claim 13 wherein the light-sensing area is sensitive to infrared and visible light and the light-emitting area emits visible light such that a feedback effect can take place to enhance interval of light emission.

22. A display device as in claim 13 wherein the carrier blocking material is made up of N,N'-diphenyl-N-N'-bis(l-naphtyl)-l-l'biphenyl-4,4''diamine (NPB) material.

23. A display device as in claim 13 wherein the light-sensing area is made up of titanyl phthalocyanine (TiOPc) material.

24. A display device as in claim 8 such that the N-type light-emitting material is beside the cathode, carrier blocking layer after the light-emitting layer, a P-type material after the carrier blocking layer and a N-type light-sensing material, after the P-type material, forming a potential barrier at the anode-contact with the device.

25. A display device as in claim 24 wherein the light-sensing area is sensitive to visible light and the light-emitting area emits visible light such that a feedback effect can take place to enhance interval of light emission.

26. A display device as in claim 13 wherein the light-sensing area is sensitive to visible light and the light-emitting area emits visible light such that there is a filter, obstructing ambient light, and allowing only a narrow

band of visible light frequencies, including frequencies emitted by the light-emitting area, to pass through for a feedback effect.

27. A monolithic display device, with an applied electric field across it, comprising of a light-emitting area and a light-sensing area, wherein there is a carrier blocking layer which resides in between the light-sensing material and the light emitting material such that there is a potential barrier at the cathode-contact with the device.

28. A display device as in claim 27 such that a first P-type light-sensing material is beside the cathode, a carrier blocking layer after the light-sensing material, a N-type light-emitting material after the carrier blocking layer and a second P-type material after the light-emitting material; wherein the P-type light-sensing material forms a potential barrier at the cathode-contact.

29. A display device as in claim 27 such that a first P-type layer consists of two different P-type materials adjacent to each other, wherein the one away from the cathode is a light-sensing material, a carrier blocking layer after the light-sensing material, a N-type light-emitting material after the carrier blocking layer and a P-type material after the light emitting material; wherein the P-type material, adjacent the light-sensing material, forms a potential barrier at the cathode-contact.

30. A display device as in claim 28 wherein the cathode-contact is made up of low work function metal and the potential barrier at the cathode-contact is a Schottky junction.

31. A display device as in claim 29 such that of the two P-type materials side by side, the one adjacent to the cathode slows dissipation of a charge build-up at the cathode caused by an incident laser on the light-sensing region.

32. A display device as in claim 28 wherein a contact at anode adjacent to the second P-type material is made of Indium Tin Oxide.

33. A display device as in claim 28 wherein the carrier blocking material is a hole blocker.

34. A display device as in claim 28 wherein the N-type light-emitting area is made of N-type organic semiconductor made of tris (8-hydroxy-quinoline) aluminum (Alq_3) material.

35. A display device as in claim 28 wherein an incident laser on the light-sensing area causes a charge buildup on the cathode-contact; wherein the P-type material adjacent to the cathode-contact has a trap energy level for trapping dissipating charges because of which it takes longer for the charge to dissipate a the cathode-contact.

36. A display device as in claim 28 wherein an incident laser on the light-sensing area causes a charge buildup on the cathode-contact; wherein there is a thin layer of a material, at the cathode-contact, having a trap energy level for trapping dissipating charges because of which it takes longer for the charge to dissipate at the cathode-contact.

37. A display device as in claim 28 wherein the light-sensing area is made of P-type organic semiconductor.

38. A display device as in claim 28 wherein the light-sensing area is sensitive to infrared light only and the light-emitting area emits visible light only.

39. A display device as in claim 28 wherein the light-sensing area is sensitive to infrared and visible light and the light-emitting area emits visible light such that a feedback effect can take place to enhance interval of light emission.

40. A display device as in claim 27 such that a first P-type material is beside the cathode, a N-type light-sensing material after the first P-type material, a carrier blocking layer after the light-sensing material, a N-type light-emitting material after the carrier blocking layer and a second P-type material after the light-emitting material; wherein the P-type material forms a potential barrier at the cathode-contact.

41. A display device as in claim 40 wherein the light-sensing area is sensitive to visible light and the light-emitting area emits visible light such that a feedback effect can take place to enhance interval of light emission.

42. A display device as in claim 28 wherein the light-sensing area is sensitive to visible light and the light-emitting area emits visible light such that there is a filter, obstructing ambient light, and allowing only a narrow

band of visible light frequencies, including frequencies emitted by the light-emitting area, to pass through for a feedback effect.